

Session Title: “AI and Machine Learning for RT

Presentation Title: “AI for OAR Segmentation and Target Delineation”

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Synopsis example:

Artificial intelligence (AI) is rapidly adopted in radiology and radiation oncology and promises to revolutionize clinical practice. Numerous applications of AI in medicine are being actively sought out. One of the important areas relevant to radiology and radiation oncology is automated segmentation for treatment planning and adaptive therapy. This talk will address applications of AI for OAR and Target Delineation in radiation oncology.

Question set 1:

1. The following represent meaningful applications of AI in medicine:

- a. Image segmentation and classification
- b. Image analysis and disease diagnosis
- c. Clinical decision-making
- d. Treatment planning
- e. All of the above.

Answer: (d)

Ref:

Xing L, Krupinski EA, Cai J. Artificial intelligence will soon change the landscape of medical physics research and practice. *Med Phys*. 2018 Feb 24. doi: 10.1002/mp.12831.

Ibragimov B, Xing L, Deep learning for segmentation of organs-at-risks in head and neck CT images, *Medical Physics* 44, 547-57, 2017

Thrall JH, Li X, Li Q, Cruz C, Do S, Dreyer K, Brink J. Artificial Intelligence and Machine Learning in Radiology: Opportunities, Challenges, Pitfalls, and Criteria for Success. *J Am Coll Radiol*. 2018 Mar;15(3 Pt B):504-508. doi: 10.1016/j.jacr.2017.12.026. Epub 2018 Feb 4.

2. Deep learning algorithm has the following features:

- a. It uses a large amount of annotated datasets to train a deep learning model
- b. It is generally computationally intensive and done using GPU
- c. Overfitting may happen if the training data is not sufficient
- d. It automatically extracts useful features to build a model
- e. All of the above.

Answer: (e)

Ref:

Wu Y, Ma Y, Liu J, Du J, Xing L, Self-attention convolutional neural network for improved MR image reconstruction, *Information Sciences* 490, 317-328, 2019.

Ibragimov B, Toesca D, Yuan Y, Koong A, Daniel C, Xing L. Neural networks for deep radiotherapy dose analysis and prediction of liver SBRT outcomes. *IEEE J Biomed Health Inform*. 2019 Mar 11. [Preview Abstract](#) PMID: 30869633.

Yuan Y, Qin W, Buyounoski M, Hancock, S, Han B, Xing L, Prostate Cancer Classification with Multi-parametric MRI Transfer Learning Model, *Med Phys*, 46, 756-765, 2019. PMID: 30597561.